

Patent Claims:

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1. A device for electrolytically treating an at least superficially electrically conducting work piece (1) having substantially opposing side edges (24), said device comprising current supply devices for the work piece, said current supply devices each comprising contact strips (5) for electrically
10 contacting the work piece (1) at the substantially opposing side edges (24).

2. The device according to claim 1, **wherein** the contact strips (5) are configured in such a manner that they are capable of holding the work piece (1).

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3. The device according to any one of the preceding claims, **wherein** at least two respective contact strips (5) are combined in one contacting frame and two contacting frames are guidedly movable toward each other or away from each other for opening and closing so that the work piece (1) can be removably
20 clamped between the contacting frames.

4. The device according to any one of the preceding claims, **wherein** the contact strips (5) are secured to a supporting frame (17).

25 5. The device according to claim 4, **wherein** the size of the supporting frame (17) is substantially the same as the size of the work piece (1).

6. The device according to claim 5, **wherein** the shape of the supporting frame (17) is substantially the same as the shape of the work piece (1).

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7. The device according to any one of claims 4 - 6, **wherein** the work piece (1) is board-shaped and rectangular and the supporting frames (17) each have

four contact strips (5) that are oriented substantially parallel to the side edges of the work piece (1).

8. The device according to any one of claims 4 - 7, **wherein** at least two supporting frames (17) are provided for retaining a board-shaped work piece (1), each of them being associated with a respective side of the work piece (1).

9. The device according to any one of claims 4 - 8, **wherein** the supporting frames (17) are capable of holding the work piece (1) either directly or through the contact strips (5).

10. The device according to any one of claims 4 - 9, **wherein** the supporting frames (17) are supported on supporting points (21) through supporting elements (6, 22, 23, 27) in a tank (4) serving to hold processing fluid.

11. The device according to claim 10, **wherein** the supporting elements (6, 22, 23, 27) are configured to be movable so that the positions of the supporting frames (17) relative to the supporting points (21) in the tank (4) may be varied.

12. The device according to any one of claims 10 and 11, **wherein** the supporting elements (6, 22, 23, 27) are configured in such a manner that a board-shaped work piece (1) that is fed between two supporting frames (17) and/or contacting frames each associated to a respective side of the work piece (1) can be clampingly held there between.

13. The device according to any one of the preceding claims, **wherein** the device comprises counter electrodes (16) that are disposed opposite the work piece (1).

14. The device according to claim 13, **wherein** the counter electrodes (16) are mounted to the supporting frames (17).

15. The device according to any one of claims 13 and 14, **wherein** the counter electrodes (16) are movable parallel to the surface of the work piece (1).

5 16. The device according to any one of claims 13 - 15, **wherein** the counter electrodes (16) are disposed substantially parallel to the work piece (1) and are movably carried on the supporting frames (17).

10 17. The device according to any one of claims 13 - 16, **wherein** the size of the counter electrodes (16) approximately corresponds to the useful area on the work piece (1) that is to be electrolytically treated.

18. The device according to any one of the preceding claims, **wherein** measuring probes are mounted opposite the surfaces of the work piece (1).

15 19. The device according to any one of claims 4 - 18, **wherein** frame covers (20) are mounted to the supporting frames (17) and/or contacting frames in such a manner that the covers (20) and the work piece (1) form closed compartments.

20 20. The device according to claim 19, **wherein** the covers (20) are fluid-tight or almost fluid-tight or wherein they are ion-permeable.

25 21. The device according to any one of claims 19 and 20, **wherein** the covers (20) are shaped in such a manner that the counter electrodes (16) are disposed within the closed compartments.

30 22. The device according to any one of claims 19 - 21, **wherein** feed tubes (25) for feeding the processing fluid to the closed compartments and drain tubes (25) for evacuating said fluid from said closed compartments are provided in the covers (20) and/or in the supporting frames (17).

23. The device according to any one of claims 4 - 22, **wherein** the supporting

frames (17), the contact strips (5) and counter electrodes (16) contained in the device are movable together as one combined unit in such a manner that, during electrolytic treatment, the work piece (1) is held by this unit while the contact strips (5) can be brought into electrical contact with the work piece (1) and that after electrolytic treatment the work piece (1) can be released from said unit and the electric contact be disconnected again.

24. The device according to any one of the preceding claims, **wherein** the device is part of a conveyORIZED plating line or of a dip plant for treating a work piece (1) being an electrical printed circuit board.

25. The device according to claim 24, **wherein** the device comprised in the conveyORIZED plating line further comprises treatment tanks (4) that are each equipped with entry and exit regions as well as conveying devices (29) for the printed circuit boards (1) and current sources for the current supply devices (5).

26. A method for electrolytically treating an at least superficially electrically conducting work piece, comprising electrically contacting the work piece (1) at substantially opposing side edges (24) through contact strips (5) serving as current supply devices.

27. The method according to claim 26, further comprising holding the work piece (1) by means of the contact strips (5) and/or by means of supporting frames (17) carrying the contact strips (5).

28. The method according to claim 27, further comprising, for electrolytic treatment, removably clamping the work piece (1) between the contact strips (5) and/or the supporting frames (17).

29. The method according to any one of claims 26 - 28, further comprising combining at least two respective contact strips (5) in one contacting frame and guidedly moving two contacting frames toward each other or away from each

other for opening and closing, respectively, so that the work piece (1) is removably clamped between the contacting frames.

30. The method according to any one of claims 26 - 29, further comprising

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- providing supporting frames (17) with four supporting frame legs each which are oriented substantially parallel to the side edges (24) of the work piece (1) being a rectangular board and/or linking together at least two contact strips (5) in one contacting frame and
- 10 - linking together two contacting frames and/or supporting frames (17) through a respective supporting frame leg or through a contact strip (5) in such a manner that the board (1) is removably clamped between the frames and
- electrolytically treating the work piece (1).

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31. The method according to any one of claims 29 and 30, further comprising disposing counter electrodes (16) on the supporting frames (17) in such a manner that they are facing the work piece (1) on one side at least.

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32. The method according to any one of claims 29 - 31, further comprising disposing frame covers (20) on the supporting frames (17) and/or on the contacting frames in such a manner that the covers (20) and the work piece (1) form closed compartments.

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33. The method according to claim 32, further comprising shaping the covers (20) in such a manner that the counter electrodes (16) are located within the closed compartments.

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34. The method according to any one of claims 32 and 33, further comprising feeding processing fluid to the closed compartments via feed tubes (25) in the covers (20) or evacuating said fluid from said closed compartments via drain tubes (25) in the covers (20).

35. The method according to any one of claims 29 - 34, further comprising

- 5 - receiving and taking hold of the work piece (1) by the supporting frames (17) and/or by the contacting frames,
- thereafter starting electrolytic treatment by supplying electric current to the work piece (1) through the current supply devices (5),
- thereafter disconnecting electric current supply after completion of electrolytic treatment and
- 10 - finally releasing the work piece (1) from the supporting frames (17) and/or contacting frames.

36. The method according to claim 35, further comprising, for a treatment in a dip plant having a plurality of treatment tanks (4),

- 15 - receiving and taking hold of the work piece (1) by the supporting frames (17) and/or by the contacting frames,
- immersing the work piece (1) together with the supporting frames (17) and/or contacting frames into a first processing fluid in a first treatment tank (4),
- 20 - in the processing fluids in the treatment tanks (4), electrolytically treating the work piece (1) by having current supply devices (5) supplying the work piece (1) with electric current and
- upon completion of the treatment in the dip plant, releasing the work piece (1) from the supporting frames (17) and/or contacting frames.
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37. The method according to claim 36, further comprising, after having immersed the work piece (1) into in a first treatment tank (4), consecutively immersing the work piece (1) together with the supporting frames (17) and/or contacting frames into further processing fluids contained in further treatment tanks (4).

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38. The method according to claim 35, further comprising, for a treatment in a conveyORIZED plating line,

- 5 - moving the work piece (1) in a horizontal direction of transport to the supporting frames (17) and/or to the contacting frames of a first treatment device in the line,
- after having been received by the supporting frames (17) and/or by the contacting frames of the first treatment device in the line, electrolytically treating the work piece (1) and
- 10 - after having treated the work piece (1) in the first treatment device, releasing the work piece (1) by the supporting frames (17) and/or contacting frames of the treatment device in the line.

39. The method according to claim 38, further comprising, after having treated
15 the work piece (1) in the first treatment device in the line,

- treating the work piece (1) in further treatment devices in the line and,
- after having treated the work piece (1) in any respective further treatment device in the line, releasing the work piece (1) by the
20 supporting frames (17) and/or contacting frames of the respective treatment device and moving the work piece (1) in the horizontal direction of transport to further treatment devices.

40. The method according to any one of claims 38 and 39, further comprising
25 holding the work piece (1) by the supporting frames (17) and/or contacting frames remain in one place in the conveyORIZED plating line during electrolytic treatment.

41. The method according to any one of claims 38 and 39, further comprising
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- moving the supporting frames (17) and/or contacting frames holding the work piece (1) in the horizontal direction of transport from an entry

- region to an exit region in the conveyORIZED plating line and
- moving the supporting frames (17) and/or contacting frames back from the exit region to the entry region after release of the work piece (1) in order to be capable of receiving a new work piece (1).